Claims

1. Optical transmission system (OTS) for transmitting optical signals (OS) consisting of N lengths of optical fiber (FDS), each comprising an optical fiber (SSMF) and a dispersion compensation unit (DCU), in which in order to transmit first optical signals (OS1) having a first data transmission rate (DR1), the compensating amounts of the first to N-th dispersion compensation units (DCU_1 to DCU_N) are dimensioned in such a way that the first to N-th lengths of fiber (FDS_1 to FDS_N) are respectively under-compensated by approximately the same under-compensation amount (D_{inline}), whereby in order to transmit second optical signals (OS2) having a second data transmission rate (DR2), a pre-compensation unit (PCU) for pre-compensating the second optical signals (OS2) is mounted upstream of the first length of fiber (FDS_1), said pre-compensation unit (PCU) having a pre-compensating amount (D_{PC}) of between 0 ps/nm and -2000 ps/nm.

2. Optical transmission system according to Claim 1, whereby the second data transmission rate (DR2) is at least double the first data transmission rate (DR1).

3. Optical transmission system according to Claim 1 or 2, whereby the pre-compensation amount (D_{PC}) is dependent on the size of the launch power (P_{launch}) of the second optical signal (OS2) having a second data transmission rate, and on the type of fiber used for transmission.

4. Optical transmission system according to one of the Claims 1 to 3, whereby the optical fiber is a standard single mode fiber (SSMF) or a non-zero dispersion-shifted fiber (NZDSF).

5. Optical transmission system according to Claim 4, whereby the pre-compensation amount (D_{PC}) for a standard single mode fiber (SSMF) is defined to a close approximation by the following relation:

$$D_{PC} = (-11+1.665 \bullet P_{launch}/ \text{ [dBm] }) \bullet D_{inline} -270 \quad \text{[ps/nm]}$$

where

P_{launch} = launch power of the optical signals having the second data transmission rate, per length of optical fiber, and

D_{inline} = average under-compensation amount of the first to N-th dispersion compensation units.

6. Optical transmission system according to Claim 4, whereby the pre-compensation amount (D_{PC}) for a non-zero dispersion-shifted fiber (NZDSF) is defined to a close approximation by the following equation:

$$D_{PC} = (-12.5+1.2 \bullet P_{launch}/ \text{ [dBm] }) \bullet D_{inline} -25 \quad \text{[ps/nm]}$$

where

P_{launch} = launch power of the optical signals having the second data transmission rate, per length of optical fiber, and

D_{inline} = average under-compensation amount of the first to N-th dispersion compensation units.

7. Optical transmission system according to one of the Claims 4 to 6, whereby the under-compensation amount (D_{inline}) during the transmission of optical signals (OS) over a standard single mode fiber (SSMF) is in the range 10 to 80 ps/nm, and over a non-zero dispersion-shifted fiber (NZDSF) is in the range 5 to 60 ps/nm.

8. Optical transmission system according to one of the Claims 1 to 7, whereby the lengths of optical fiber (FDS_1 to FDS_N) in the optical transmission system (OTS) are between 40 km and 120 km long.

9. Optical transmission system according to one of the Claims 1 to 8, whereby an optical fiber ($SSMF_1$) and a length of fiber (DCF_1) having a dispersion compensation unit (DCF_1) form an optical transmission module, and an optical transmission system (OTS) consists of a plurality of optical transmission modules arranged in series.

10. Optical transmission system according to one of the Claims 1 to 9, whereby the optical transmission system (OTS) has a bi-directional operating mode.